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## INFORMATION TECHNOLOGY IN HIGHER STUDIES

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### ABSTRACT

Technology has an important impact in all aspects of higher education worldwide. It brings new opportunities and means for improving access and the quality of higher education. Yet, for various reasons the inclusion of how to use technology to improve higher education is uneven from region to region, country within a region, and institutions within a country. Thus, while recognizing and pursuing the important potential to bridge divides and to reduce inequalities in terms of access to knowledge and information, it is important to acknowledge that the risk of exacerbating existing or creating new inequalities is equally high as it requires means, necessary infrastructure and human skills to harness the potential of technology in higher education. The aim of the Information Technology is to pursue that the potential of technology is fully harnessed to improve the quality of higher education and to increase access to knowledge and education for all.

The higher education community is planning for a world in which information technology (IT) will be so pervasive that the very institution of higher education will change. Of course, IT probably can be used to improve higher education. But IT is exceedingly flexible, and we will face numerous choices about how best to apply it. Some of those choices are straightforward matters of efficiency, best left to technical experts. Other choices will require us to reflect carefully on the values that a university ought to express. If educators have learned anything from attempts to improve life using IT, it is that significant improvements are possible only when institutions are rethought. But in order to rethink institutions in a responsible way, we first need language to describe them.

Keywords: Information, Technology, Impact, Higher Studies, Implications

### The Implications for Higher Education

Institutions of higher education now compete on the basis of their distinctive programs: one economics department, for example, might be ranked above another in a magazine survey. Departments can design the curricula for their majors according to their own distinctive approach, and students can choose the program that fits best with their values and goals. Universities can design their core curricula according to an overall educational philosophy. Because decisions about program philosophy and course content are made by the faculty, the contents of and boundaries between courses are flexible; they can be changed to suit evolving circumstances, not least the interests of the best students.

A radical increase in articulation would threaten this flexibility. Allowing students to earn academic credit at multiple campuses is often a good thing. It can create financial tension between the campuses, but it also permits students to save money, discover new interests, or overcome imperfect high school transcripts. The University of California recognizes this fact; for decades, it has encouraged students to transfer from community colleges into the UC system, even though the transfer students sometimes find this transition difficult. But if it becomes radically easier to transfer course credit between schools, thus effectively enabling students to assemble their college education *a la carte* from among the offerings of a large number of potentially quite different programs, then, intellectual diversity may suffer.

### **Important Choices**

As the higher education community decides how to use IT, then, it faces important choices. Before advanced communications technologies became widespread, educational decentralization and diversity were promoted by the limitations of the physical world. Universities were distant from each other geographically, and it was relatively difficult to transfer people and practices between them; consequently, different universities evolved along somewhat independent paths. Now, however, that independence -- that separate evolution and diversity of educational approach -- exists only if educators actively choose to foster it. And because the local benefits of standardization are easier to quantify than the global benefits of diversity, broad awareness of the issues is crucial. A new generation of students, never having encountered higher education before, may not even recognize the dangers of a centrally planned educational economy or an intellectually homogeneous society.

### **The Role of Information Technology in Education**

The Role of Information Technology in Education is exploring the potential for technology to redefine the terms of teaching and learning. Can the tools of technology, properly used, break through the barriers to educational progress? What inhibits the effective use of technology? What are the perceived and the real limits of these tools? Thirteen grantees are helping to answer these questions.

When The Hitachi Foundation designed this initiative in 1998 we noticed that computers in classrooms, frequently donated by well-intentioned companies, too often sat idle, or if used, amounted to little more than enhanced typewriters. We concluded that making computers available in schools was not sufficient to realizing technology's potential.

This initiative explores factors necessary to help technology reach its potential for learning. From the public school to the university setting, from local communities to nonprofit organizations, these grantees each offer a unique perspective on the role of technology in education.

### **Early Assumptions**

The Foundation issued the Tech Ed Letter of Intent on September 15, 1997 based on these ideas:

1. A vast majority of schools have the equipment. Schools, districts, and states seem to have found money for hardware, but have invested only meagerly, if at all, in training teachers to use the technology.
2. The education sector has no systemic approach to upgrading the skills of its professionals in both pre-collegiate and higher education. If done at all, in-service technology training for teachers has been limited in number served and scope, traditional in its delivery (typically one-time sessions), or left primarily to individual teacher initiative. Training typically has not helped teachers understand how to integrate technology into the curriculum.
3. There are pockets of innovation. Individual teachers, students, and communities are delivering specific advances at every educational level. Advances can be grouped into 5 categories:
  - Pedagogy: enhanced capacity for tailoring instruction for individual students and monitoring student performance to assess instruction efficacy.

- Constructing local content: through collaboration made possible by technology, students or professors in several locations, drawing on local content can transform classroom practices.
- Professional development: information technology makes possible high-quality professional development at times convenient for the teacher. Technology can overcome school scheduling problems by delivering training during off-hours or as the teacher works with students and colleagues in the classroom.
- Collaboration: teachers and students can collaborate outside the classroom in synchronous (real-time) and asynchronous (delayed response) fora, which brings far more resources, perspectives, and analysis to classroom assignments.
- Economic efficiency: schools and universities are finding ways to use technology creatively to save money or expand productivity.

4. Technology is a tool – a means rather than an end.

5. Using technology effectively in the classroom means transforming the classroom, teaching, and learning. Productive use of technology does not mean using it solely to help slow students catch up, to occupy quick achievers, to reward good behavior, or to baby-sit. Where technology is yielding results, the classrooms are student-centered, with teachers as coaches and guides. Outside resources come to class and students go outside the classroom. Technology allows engagement, review, and especially assessment in broader, deeper ways.

#### Portfolio Goals

The Foundation Board approved 13 projects for funding in July, 1998. In addition to each project's individual goals, we had these broad goals for the portfolio:

- Illustrate how technology is being used to make possible new methods, outcomes, and advancements in teaching and learning.
- Illustrate specifically how information technologies can improve or advance teaching or learning, and for whom.
- Identify unused or unexplored opportunities to strengthen teaching and learning through the use of information technology.
- Advance the practice of collaboration.
- Document and disseminate program models.

#### Grantees

*California State University Dominguez Hills, Carson, CA*

This project is creating interactive Web Site teaching applications for K-12 teachers in the Banning/Carson Cluster (Los Angeles Unified School District). Teachers will be able to tailor self-paced and class-wide instruction, develop and revise the applications, monitor and evaluate their approaches and student performance on specific subjects and problems, provide students with individual problem sets, and collaborate with other teachers.

*Catholic University of America, Washington, DC International Virtual Department for Historical Studies of Mathematics*

The Catholic University of America, in partnership with the Mathematical Association of America and numerous scholars at universities worldwide (including Oxford, Russian Academy of Sciences, Princeton, and Kyoto), is implementing, evaluating, and disseminating an International Virtual Department for Historical Studies of Mathematics.

*The Children's Museum, Boston, MA - Teacher-to-Teacher On-Line @ The Children's Museum*

The Children's Museum's Teacher Center is creating Teacher-to-Teacher On-Line @ The Children's Museum, a training and discussion forum for elementary teachers to exchange activities, ideas, and curriculum as the state institutes new curriculum frameworks.

*Delaware Education Research and Development Center, University of Delaware, Newark, DE First-State Instructional Resource System for Teachers (FIRST)*

This project is establishing, testing, and refining the First-State Instructional Resource System for Teachers. FIRST is an Internet-based professional development system linked to Delaware's state education reform movement. The site will include professional development units that illustrate effective teaching of curriculum concepts, curriculum units linked to state standards, teacher discussion and collaboration forums, teacher comments on curriculum units, related commercial curriculum resources, and assessment techniques.

*Eagle Rock Junior/Senior High School, Los Angeles, CA*

The Eagle Rock Junior/Senior High School started The Talons 2000 Academy - a four-year, college preparatory program with a focus on business and technology. The Academy, within the walls of ERJ/SHS, is developing a student-led business to build, refurbish, and support computers throughout ERJ/SHS, the LA Unified School District, and the community.

*Information and Referral/Volunteer Connection, Coeur d'Alene, ID*

Community Science Online uses information technology to teach science by integrating scientific content with local and regional history and discussions of contemporary events in an interactive Multi-Object-Oriented environment.

*Leadership, Education, and Athletics in Partnership, New Haven, CT - LEAP Computer Learning Centers*

Leadership, Education, and Athletics in Partnership, in conjunction with the Hartford and New Haven Housing Authorities, Yale University, and Connecticut College is creating parent and student outreach programs in LEAP Computer Learning Centers in three CT cities. LEAP is evaluating the impact of the centers' programs on child development and technology skill building and increasing the breadth of technology training for LEAP parents and schools.

*New York Institute of Technology, Central Islip, NY - Educational Enterprise Zone*

The New York Institute of Technology, in partnership with the Nassau and Dutchess County Board of Cooperative Educational Services and seven museums is creating an Educational Enterprise Zone. Linked by low bandwidth videoconferencing and a host of other technological tools, museums, libraries, teacher centers, and others will beam their knowledge into schools.

*Northwest Arctic Borough School District, Kotzebue, AK - The Virtual Village*

Northwest Arctic Borough is creating The Virtual Village project to train student technology leaders to be mentors to teachers, students, and staff in order to help teachers incorporate modern technology so students can preserve and spread traditional cultural knowledge. The project addresses challenges and opportunities that include a transient teaching pool, isolated villages accessible only by air, and curriculum material that is not linked to village realities or traditional knowledge and ways.

*Scott Lane Elementary School, Santa Clara, CA - 1000 Days to Success in Reading*

Scott Lane Elementary School is adding technology as it starts the second year of its 1000 Days to Success in Reading project - a warranty program that guarantees all children who entered kindergarten in September 1997 will be reading at or above grade level by the end of second grade. The project is training teachers to use technology and integrate it into the curriculum, establish a cyber-space library, allow broader interactions among teachers to expand their resources and support services, and engage parents, community volunteers, and the larger school population in the educational process.

*Tucson Unified School District, Tucson, AZ - Community Learning Project*

The Tucson Unified School District, in collaboration with The University of Arizona, is implementing the Community Learning Project at two elementary schools. The project will coordinate three existing pilot programs to provide a comprehensive, experiential, interdisciplinary education experience for children and their university mentors.

*Virginia Polytechnic Institute and State University, Blacksburg, VA - Facilitating the Community as a Learning Community*

The Facilitating the Community as a Learning Community project expands and improves the Blacksburg Electronic Village community network and its links to K-12 education and community interaction with a new Web-based multi-user domain. The project will develop, implement, and investigate educational activities that involve real-time collaboration with community members and activities that engage citizens on matters of community interest.

*World Game Institute, Philadelphia, PA - NetWorld Game Learning Project*

The World Game Institute (WGI) and four collaborating museums are supporting the NetWorld Game Learning Project -a comprehensive Internet-based education program for high school teachers and students. The NetWorld Game Learning Project creates an Internet-based simulation of real world situations that complements high school curricula in four U.S. cities.

*University of Oklahoma Colleges of Engineering and Education, in partnership with the State Department of Education, Norman, OK*

The Colleges of Engineering and Education, in partnership with the Oklahoma State Department of Education, is creating an Internet-based training program to instruct teachers how to incorporate electronic media into their classrooms. Teachers learn how to develop and use graphics, animation, simulation, distance learning, network-based collaboration, online courseware, and streaming video to both amplify their teaching style and immerse students into the constantly changing world of technology.

### **Conclusion**

The evolution of information technology reached a turning point with the development of the Internet. Once a government project, the Internet was created for military purposes. Through the course of its development, researchers began finding other uses for the network, and use of the technology spread worldwide. Access to the Internet today by individuals, businesses, and institutions alike has created a global market for Internet service and has spurred an increase in productivity in the technological communication field.

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